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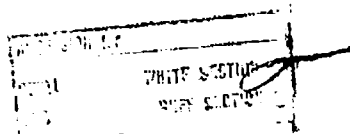
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ON THE BIOLOGY OF THE MOSQUITO AEDES TOGOI THEOB

Following is the translation of an article by V. I. Shestakov, 178 Sanitary Epidemiological Laboratory (Primorskiy Kray, Khasan District, Settlement Zarubino), published in the Russian-language periodical Zoologichnyy Zhurnal (Zoological Journal), Vol 40, No. 2, pages 284--285. Translation performed by Sp/7 Charles T. Ostertag, Jr.

Aedes togoi is the carrier of Japanese encephalitis. ~~On certain~~ islands of Southern Primorye these mosquitoes have a predominant distribution. During 1957--1959, we carried on observations of their biology on one of the sectors of the coast of the Japanese Sea. Based on the method proposed by P. A. Petrishcheva, we collected the summer and autumnal eggs of Ae. togoi, in the winter period they were maintained in nature.

The first egg laying by Ae. togoi takes place in the first half of June, and the greatest number of eggs are laid in July and August. Egg laying lasts until late fall. In 1957 eggs were found which were laid after 30 October.

The mosquitoes lay their eggs after 24 hours following a single blood sucking. They lay the greatest amount of eggs on the 3rd day. Under laboratory conditions, egg laying may last up to 5 days and longer. One moderately saturated mosquito may lay up to 80 eggs, on the average moderately saturated mosquitoes lay up to 30 eggs. In the spring, upon completion of hibernation, the eggs were transferred from nature to the laboratory and wetted with water. On the average, after 60--72 hours following wetting, Ae. togoi larvae hatched from eggs which were laid in August, September, and October. From the eggs which were laid in June and July the hatching of larvae did not take place in our tests. Only individual eggs which were laid in July yielded the breeding of larvae. The hatching of eggs which were laid after 30 October took place in 2 weeks following wetting.

Under the natural conditions of Southern Primorye, Ae. togoi overwinters only in the egg phase. But under the conditions of a warm winter they may overwinter in the larval phase.

The eggs with the formed larvae are resistant not only to low temperatures, but also to desiccation. Even before the emergence of the larvae we observed eggs which were found for more than an hour in a dry condition at a temperature of 20°; in an hour following wetting the

larvae emerged from them. For the formation of larvae it is not compulsory that the egg be wetted with water. Development may take place on wet filter paper, but the percentage of hatching of larvae from such eggs is very low.

In the fall the small water reservoirs dry up. The eggs which were laid in them are subjected to desiccation and winter in such a state. The large water reservoirs do not dry up completely, but the amount of water in them is noticeably decreased. With the onset of the cold they freeze. In Southern Primorye the temporary freezing of water reservoirs takes place in the end of November and the beginning of December. During the day the water reservoirs are well heated by the sun, they thaw out during all of December.

Beginning with the first 10 days of January the water reservoirs in which water is preserved completely freeze over. In certain water reservoirs in the winter the water freezes up to a day. In the third 10 days of February in water reservoirs which are well heated by the sun and protected from the wind, the ice near the rocks begins to thaw out. The complete melting of ice in the water reservoirs takes place during the first 10 days of March, and sometimes it may be drawn out up to the end of March. Thus, the period for partial freezing is 3.5--4 months, and the period for complete freezing - 1.5--2 months. The eggs of Ae. togoi preserve their vitality in all these water reservoirs.

In Spring the hatching of Ae. togoi larvae from eggs which had overwintered in various types of rocky water reservoirs takes place in various periods. The earliest larvae to hatch are those in water reservoirs which are well heated by the sun and protected from the wind, when the average water temperature for 24 hours reaches 4--5°. In 1958 the first hatching of Ae. togoi larvae from overwintering eggs took place in the beginning of April, in 1959 - from 18--20 March. In poorly heated waters the hatching of larvae takes place in June, that is 2--2.5 months later.

The breeding of larvae from eggs continues up until late fall. In 1958 the breeding of larvae in certain water reservoirs took place in the second half of October. From the end of October the period of wintering begins for the eggs. They are found in such a state for 140--150 days. In the second half of December 1958 we found Ae. togoi larvae in the ice, where they were found for 10--12 hours. The larvae revived in water at room temperature and began to move actively.

Under the conditions of Southern Primorye, Ae. togoi larvae are encountered up until the end of December. In 1957 live larvae were found by us for the last time on 27 December. Larvae of the II and III instar are the most resistant to low temperatures. They are encountered up until the end of December. We found larvae I and IV only up until the end of November. Ae. togoi pupae appear in the first 10 days of May and are

encountered up until the end of November (the last finding was on 26 November), when the temporary freezing of water reservoirs has already begun.

According to the data of P. A. Petrishcheva (1947), K. P. Chagin (1943), and our observations, the emergence of the first generation takes place in the second 10 days of May before the flowering of bird cherry in the coastal zone. The last winged mosquitoes were caught by us in the beginning of the third 10 days of October. But, based on egg laying, which was found in the end of October to the beginning of November, the disappearance of winged mosquitoes may take place in later periods also.

In recent years Ae. togoi began to settle closer to the dwellings of man. The larvae breed in fire fighting tanks, and in fishing villages a frequent place for breeding are the pickling vats which are filled with fresh water. In August in the fire fighting tanks the density of larvae reaches 500 specimens per insect net. The winged mosquitoes settle in living quarters for blood sucking and often remain in them during the daytime. With the presence of people in the living quarters the mosquitoes may attack them during the day.

We established that under natural conditions in June with an average water temperature of 20.7° , the development of larvae lasts for 17 days, and for pupae -- 3 days. In July with an average water temperature of 21.7° the development of larvae lasts 14 days, and pupae -- 60 hours. In August with an average water temperature of 23.7° the development of larvae lasts for 11 days, and pupae -- 2 days.

For preventing the breeding of Ae. togoi the most effective means turned out to be treating the water reservoirs with DDT preparations in the first half of May, prior to the emergence of mosquitoes of the first generation. Subsequently it is sufficient to conduct a single monthly treatment, which will prevent the emergence of winged mosquitoes. However, usually in the first half of May it is not possible to render all the water reservoirs harmless, since some of them will still be without water and they will escape attention. Therefore it is necessary to conduct a repeated treatment of water reservoirs in approximately a week following the first rain, which will fill all depressions with water, and the larvae will hatch in all water reservoirs where the eggs of mosquitoes were laid in the fall.

By following such tactics, we achieved almost the complete liquidation of Ae. togoi on one of the peninsulas of Southern Primor'ye.

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